Down to Earth Antenna

Robert McGregor VK3XZ takes an historical look at a ground aerial.*

Australia and the African Desert have a common need for radio communication and a mainly sandy terrain. VK5TL's letter, AR Jan '92, caused me to dig deep into a pile of ancient documents and in "Instructions to Australian Signallers" there was this piece of information for our guidance. I quote:

1. (a) A ground aerial is a length of insulated wire attached to the aerial terminal of a wireless set and laid out along the ground in the direction of the distant station. Although it lies horizontal, it radiates ground waves; it is thus an exception to the general rule that vertical aerials are used for groundwave working.
   (b) A ground aerial gives approximately the same range as a 6 ft rod.
2. (a) A ground aerial is useful in positions where a rod would be dangerously conspicuous. It may be buried to a depth of about an inch, to prevent people tripping over it, without losing much of its efficiency.
   (b) Ground aerials are less likely to screening than rods, and may provide the only means of getting communication when the sets are in woods or amongst buildings. A station using a ground aerial can work satisfactorily to a station using a rod.
3. (a) A ground aerial radiates well in the direction of its length, but very badly at right angles to its length. Ground aerials are unsuitable for large groups on account of their directive properties.
   (b) A counterpoise may sometimes be used with a ground aerial. It consists of another length of insulated wire connected to the earth terminal of the wireless set and laid out along the ground in the opposite direction to the aerial. When a counterpoise is used, it should point towards the distant station, and the aerial in the opposite, because the radiation will probably be greater in the direction of the counterpoise than in that of the aerial.
   (c) The directivity of a ground aerial may be helpful in attaining a degree of secrecy, since little radiation is sent out at right angles to the aerial.
4. (a) The best length for a ground aerial is:— Distance in feet = (375/Frequency in MHz) (114.3/fMHz) metres). If a counterpoise is used, it should be about the same length.
   (b) These lengths are not critical. If the aerial is short, it will work almost as well; if it is too long, however, the efficiency will be reduced. Therefore a ground aerial should always be made shorter than the best length rather than longer, which means it should be cut for the highest frequency that may be used.
5. Insulation — it is important that the aerial and the counterpoise (when used) should be properly insulated. The most common fault is failure to seal the end of the wire distant from the set."

I point out that in all sets referred to, the output circuit was designed to feed into something less than a quarter wavelength. An outboard series fixed condenser was normally available where the available antenna was too long. Frequencies were between 4 and 7 MHz.

Tests over this frequency range showed an average difference of 16 dB between a 6 ft rod and one of 18 ft. Beyond this height, a small capacity hat, four radial rods, 2 feet long, gave the best results.

I hope this piece of historical information is of assistance to the happy band of aerial experimenters.

**2 Wiltshire Drive Somerville Vic 3912*

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